REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
	Viewgraphs	

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Establishing a Software Cost Estimating Process	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
Robert Chin	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
Naval Air Warfare Center Aircraft Division 22347 Cedar Point Road, Unit #6 Patuxent River, Maryland 20670-1161	

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
Naval Air Systems Command 47123 Buse Road Unit IPT Patuxent River, Maryland 20670-1547	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Robert Chin
Unclassified	Unclassified	Unclassified	Unclassified	19	19b. TELEPHONE NUMBER (include area code) (301) 342-2143

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39-18

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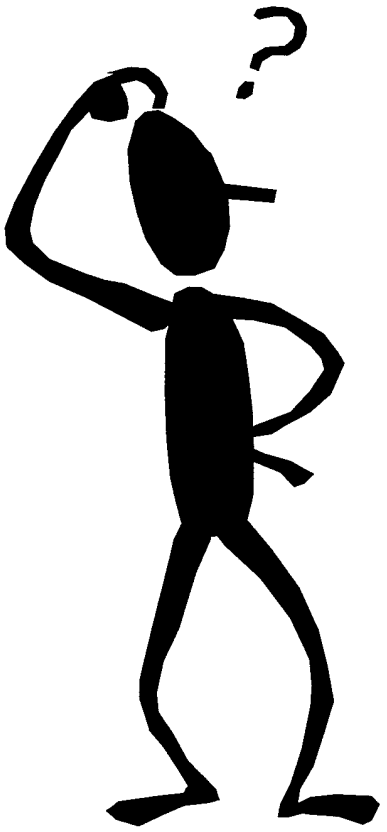
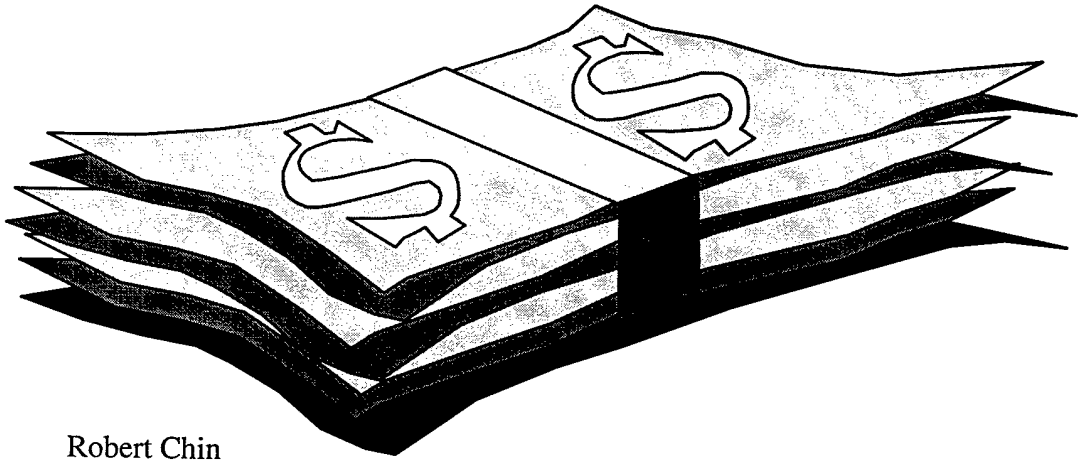
Establishing a Software Cost Estimating Process



Society for Software Quality
Washington DC Area Chapter
RoundTable - 24 January 2000



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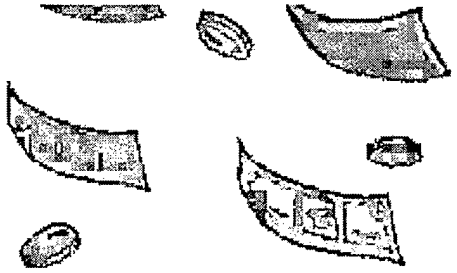
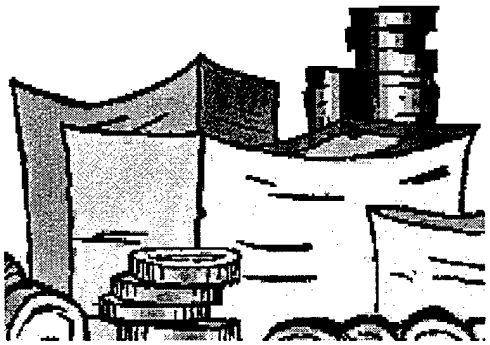
Presentation Outline

- Introduction
- Working Group Plan
- Where are we? - A Survey
- Developing a Process
- What's Next? - Miles to Go



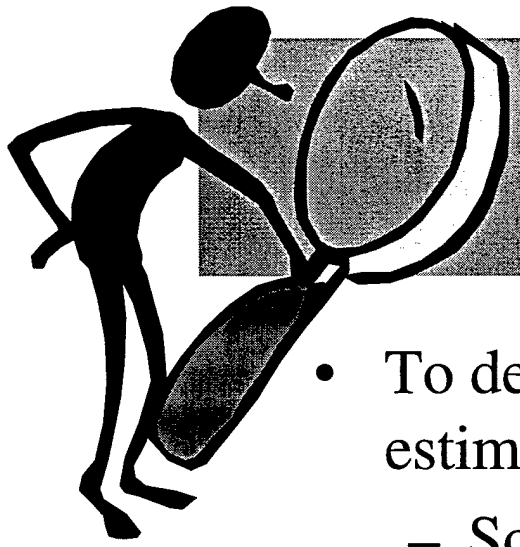


Introduction

- Many software-intensive programs are experiencing cost and schedule over-runs
- The senior leadership believes that poor software cost estimates are a major contributor
- A Software Cost Estimating Working Group was chartered in February 1999 to establish a formal process to develop credible estimates

Working Group Plan

- A relatively short timeframe and a shoestring budget (part-time personnel/local travel only) dictated our approach
- Seek and sort out best practices to incorporate into process
- Identify the tools, data and documents to support the process
- Working group composition
  - Electronics / Software Engineers
  - Cost Analysts / Industrial Engineers / Operations Research Analysts
  - Advisory Group (Software and Cost Managers)

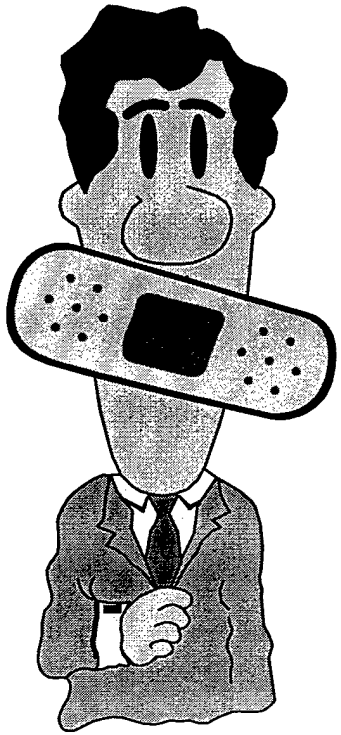


Where are we? - A Survey

- To determine how projects are developing software cost estimates. We asked about:
  - Software effort type (i.e., Concept Exploration, System Development, System Enhancement, Corrective Maintenance)
  - Sizing techniques used
  - Effort/Cost and schedule techniques used
  - Level of satisfaction with cost estimating techniques
  - Project characteristics (e.g., application domain, software size, language(s), SEI-CMM level of developer/maintainer)

Where are we? - A Survey

- Ground Rules
  - All survey participants (projects and individuals) shall remain anonymous outside the core Working Group members
  - No attribution of survey responses



Where are we? - Survey Results

- Survey Project Characteristics
  - Total Lines of Code ranged from 4,000 - 1,500,000 for 25 projects
  - Programming Languages: Ada, Fortran, C, C++, Assembly Language, PL/1, Pascal, Microcode
  - Application Domain: Mission Computer, Navigation, Flight Control, Communications, Mission Planning, Test Software, Weapons Targeting and Control, and Display Processing

Where are we? - Survey Results

- Most projects do not have a formally documented process for estimating software costs (3 of 25 projects)
- Projects that maintain a historical data base of completed and on-going software efforts produce the best estimates
- Training to perform software cost and schedule estimates is lacking
- Most projects lack historical data to perform software cost estimates, but are beginning to collect historical data
- Estimating software size is the most critical and least well performed activity

Where are we? - Survey Results

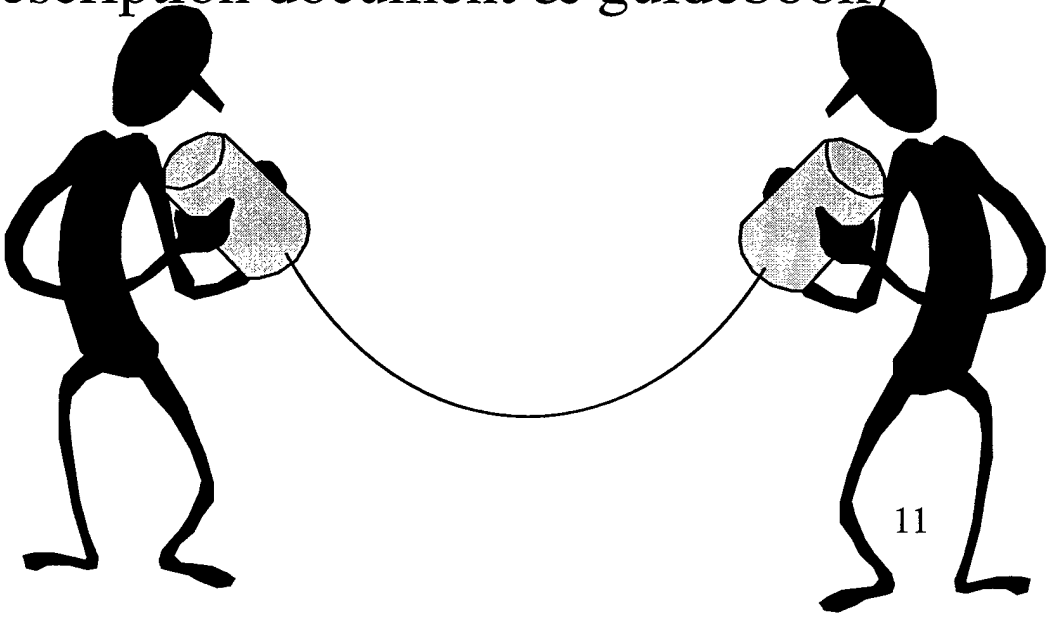
- Changes (e.g., requirements, schedule, funding, facility resources, etc.) during project execution often render initial estimates obsolete.
- Sizing techniques that worked best are: Analogy, Expert Judgement (i.e., Delphi Technique) and Decomposition
- Effort/schedule estimating techniques that worked best are: Analogy, Decomposition and Expert Judgement
  - Suspect that parametric models did not produce better results due to lack of historical data to calibrate models

Developing a Process - Approach

- The working group developed a process framework that projects/organizations tailor to meet their need because "One size does not fit all".
- The role and activities of each organization involved in developing an estimate was described in a deployment flowchart and companion description document.
  - Describes "what" needs to be done.
- An estimating guide was developed to specify the "how to" part of the process.
  - For the folks who will be developing estimates

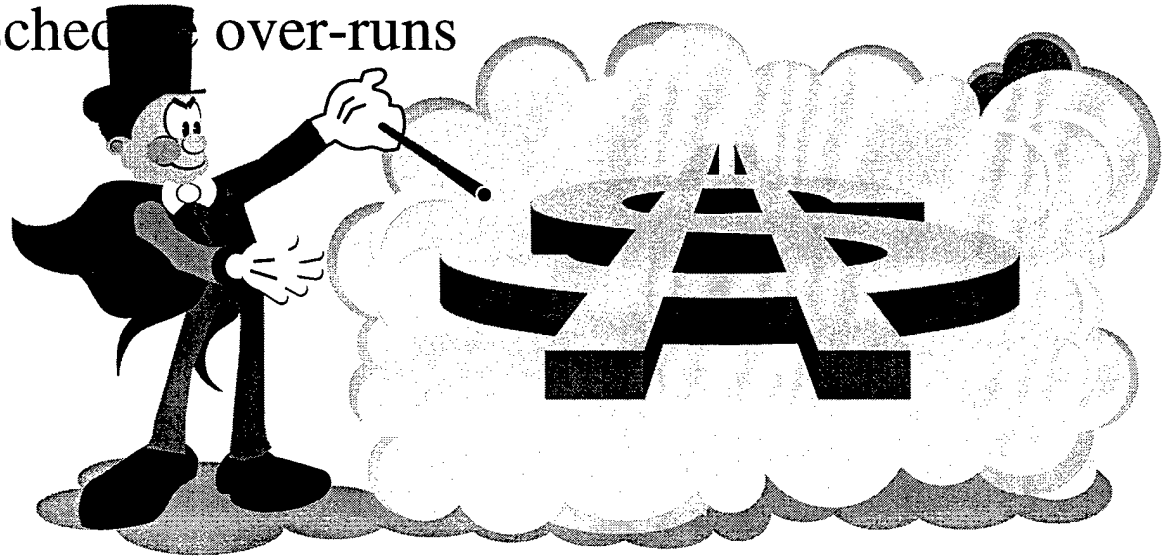
Developing a Process - Working Group Interaction

- Although English was everyone's primary language we had to learn each others "software" and "cost" dialects
  - Cost folk's experience was primarily with hardware
- Drawing pictures (i.e., process flowchart) and writing things down (process description document & guidebook) helped communication



Developing a Process - Expectation Control

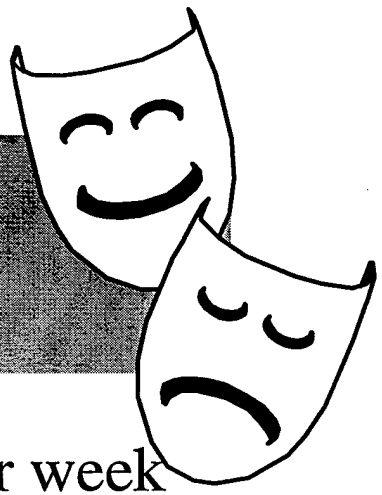
- Some managers understood that it would take literally years of collecting and analyzing actual data to gradually improve estimates
- However, other managers were seeking a Silver Bullet
- Improving software estimates is an evolutionary process
- Software estimate is only one of several contributors to cost and schedule over-runs



What's next? - Miles to go

- Develop training materials to implement the process
- Software estimating process needs to be tested
  - Pilot project with two independent estimating teams
- Provide training, tools and collect estimate vs. actual data to support the process
- Establish a measurement and analysis program to assess process performance and provide feedback for process improvement
- Integrate the software estimating process with on-going corporate Software Business Process Re-engineering initiatives (i.e., reach Software Engineering Institute Capability Maturity Model Level 5)

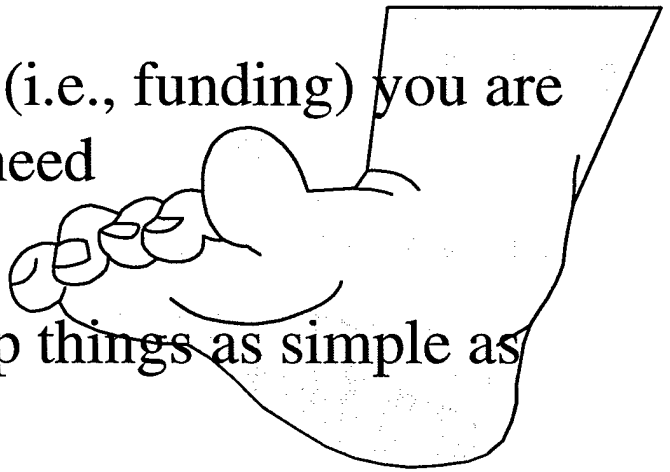
Lessons Learned

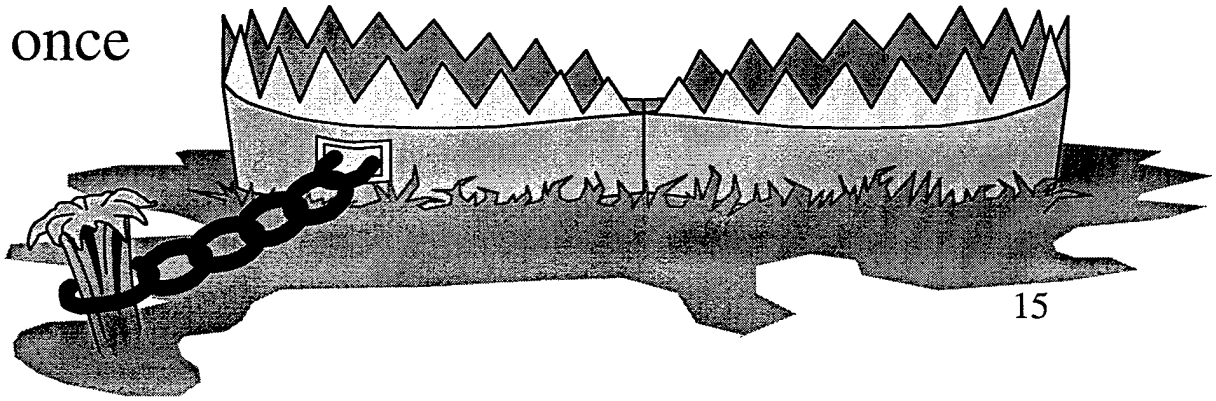


- Assign a staff with a dedicated number of hours per week authorized by management in writing. Do not assign as a collateral duty.
- Clearly define the scope and document your plan
  - Disseminate widely to manage expectations early
- If you do a survey, keep it short. Responses should not require a lot of "leg-work" or research
  - You can always follow-up for more info
  - Do surveys verbally, but give folks a heads-up
- Verify quality of materials/data sources before incorporating it into your plan

Lessons Learned

- The 20/80 percent rule is true (i.e., 20% of the people do 80% of the work)
- Do what you can with the resources (i.e., funding) you are given, you will never get what you need
  - leverage, leverage, leverage
- Put yourself in the user's shoes, keep things as simple as possible to facilitate understanding
- Think twice, speak once

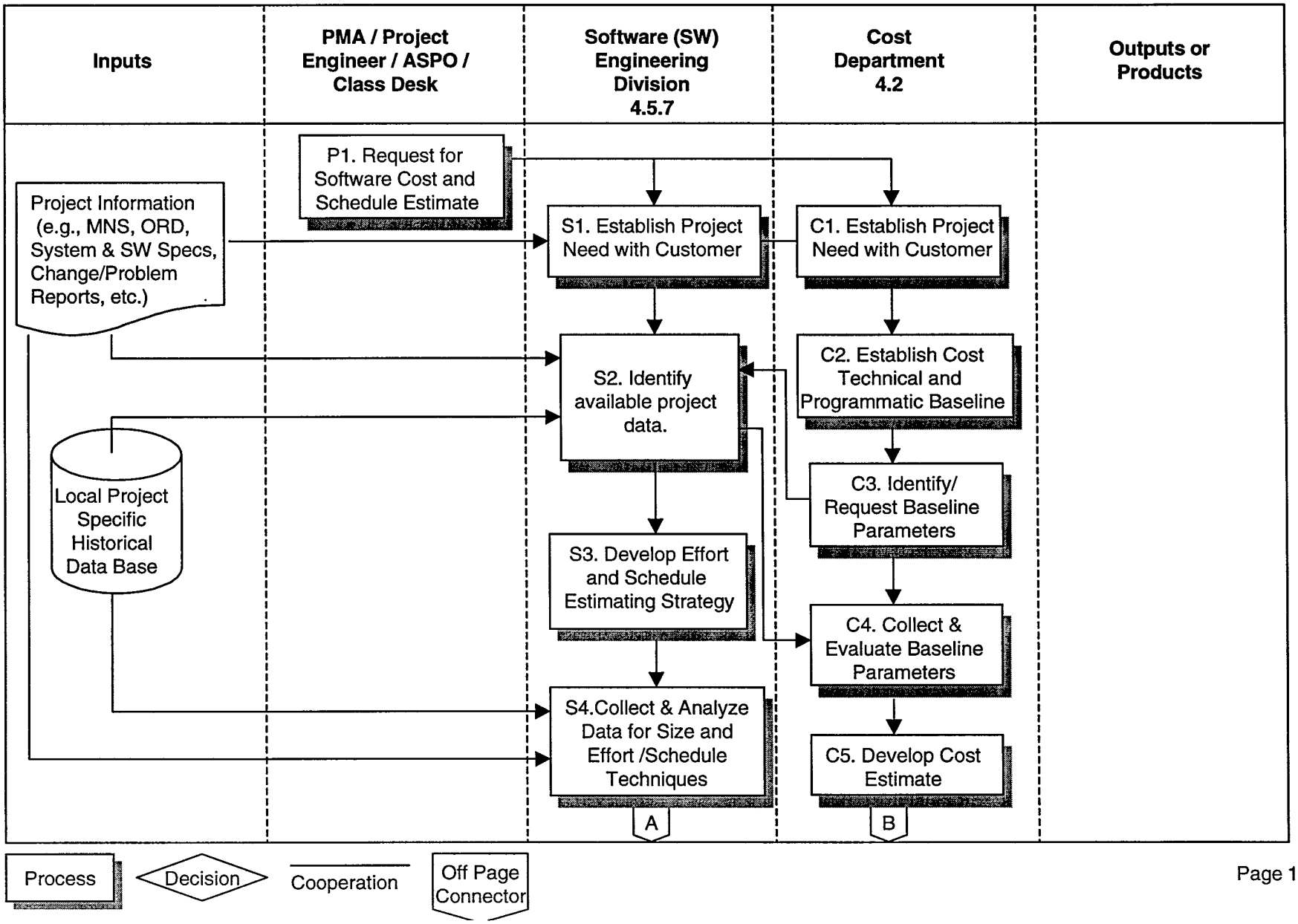




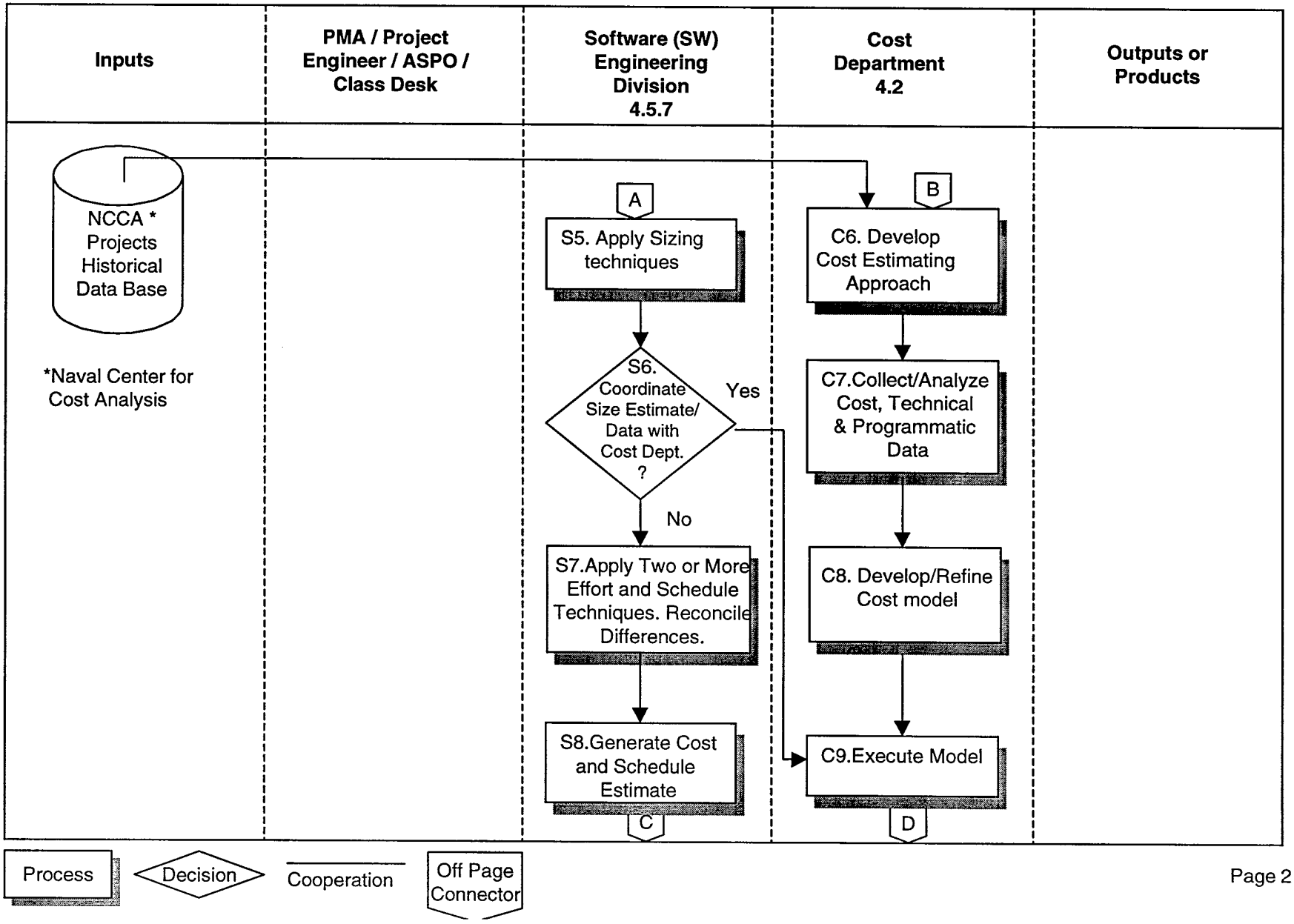
Back-Up Materials

Software Cost Estimating Process

Updated: 6/17/99



Software Cost Estimating Process



Software Cost Estimating Process